

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of

Amendment of the Commission's Rules to)	
Facilitate the Use of Cellular Telephones)	WT Docket No. 04-435
and other Wireless Devices Aboard)	
Airborne Aircraft.)	

**REPLY COMMENTS OF TELENOR SATELLITE SERVICES, INC. AND
ARINC, INC.**

Telenor Satellite Services, Inc. ("Telenor"), on behalf of itself and ARINC, Inc. ("ARINC"), hereby submits its reply comments in the above-captioned proceeding.¹

I. Summary

Telenor and ARINC again wish to commend the Commission for undertaking difficult issues in this proceeding and for realizing the promise that pico cell technology holds. While we are in agreement with some commenters in various respects, we feel that other commenters would like for the Commission to adopt overly restrictive rules regarding interference to terrestrial CMRS communications networks.

We recognize that the terrestrial CMRS network operators have valid concerns in this proceeding. However, we wish to emphasize for the Commission that pico cell system testing is currently underway and technological advances that will mitigate interference to terrestrial networks are currently being developed. For this reason, we

¹ *Amendment of the Commission's Rules to Facilitate the Use of Cellular Telephones and other Wireless Devices Aboard Airborne Aircraft*, WT Docket No. 04-435, FCC 04-288 (rel. Feb. 15, 2005) ("*NPRM*").

urge the Commission to consider the full record, including the results from on-going air and ground testing, when promulgating rules in this proceeding.

II. Discussion

A. The FCC Should Not Limit This Proceeding to Part 22 devices.

We agree with the other commenters that this proceeding should not be limited to Part 22 devices only, and that the Commission should adopt rules that at least cover other mobile phone technologies.² It is necessary to adopt rules that apply consistently across the various mobile phone technologies. As we stated in our comments, the general public considers the available mobile phone technologies under the broad heading “cell phones” or “mobile phones” and it would simply not serve the public interest to only focus on Part 22 devices in this proceeding.³

B. Pico Cell Systems are an Effective Technological Solution to Interference.

Telenor and ARINC reaffirm our position as stated in our previous comments that the pico cell concept is ideal for the use of mobile phones onboard aircraft in flight. In

² See Comments of AirCell, WT Docket No. 04-435, filed May 26, 2005 at 3, 4; Comments of Telecommunications for the Deaf, Inc. and Deaf and Hard of Hearing Consumer Advocacy Network, WT Docket No. 04-435, filed May 26, 2005 at 4; Comments of Honeywell, WT Docket No. 04-435, filed May 26, 2005 at 6, 7; Comments of Motorola, WT Docket No. 04-435, filed May 26, 2005 at 3-5; Comments of Iridium, WT Docket No. 04-435, filed May 26, 2005 at 3; Comments of Qualcomm, WT Docket No. 04-435, filed May 26, 2005 at iv; Comments of Ericsson, WT Docket No. 04-435, filed May 26, 2005 at 8.

³ We use the term “mobile phone” in a generic sense to refer to Part 22, Part 24, Part 27 and Part 90 devices. In addition, we use the term “terrestrial networks” to refer to any ground-based wireless network using Part 22, Part 24, Part 27 or Part 90 frequencies.

addition to allowing for the control of mobile phone power levels, a pico cell system can also allow the flight crew to control the use of mobile phone devices altogether, while at the same time serving to minimize potential interference to both terrestrial networks and aircraft avionics. However, we wholeheartedly agree with CTIA's assessment that, "[T]he use of pico cells aboard aircraft...clearly needs more investigation."⁴ We raise this point to reiterate that while some parties in this proceeding have thus far come to differing conclusions as to the interference potential of mobile phones aboard aircraft, testing of pico cell systems is on-going.

Telenor and ARINC are confident that further research and testing will lead to the development of a pico cell system that reasonably addresses the concerns of terrestrial CMRS licensees and furthers the Commission's goals of facilitating the introduction of new and innovative communications services to customers aboard aircraft in flight. To this end, we ask the Commission to refrain from adopting overly strict technical rules in this proceeding and to not adopt any regulations prematurely, without all of the possible information that is currently being developed from on-going technical studies.

By way of background, Telenor and ARINC, through a partnership called AeroMobile, have designed a pico cell system which connects the onboard pico cell, via a satellite link, to the ground network, providing interconnection to the PSTN. AeroMobile's proposed operations would allow passengers to use their personal mobile handsets to "roam" onto the pico cell, whereby service would be provided if the pico cell operator and the passenger's mobile phone provider had established a roaming agreement for the purpose of providing such service.

⁴ Comments of CTIA, WT Docket No. 04-435, filed May 26, 2005 at 5.

By using a satellite link rather than cellular or PCS spectrum for the air-to-ground link, the AeroMobile system offers clear advantages for substantially minimizing interference potential. As SITA correctly noted in its comments, because a satellite link uses different spectrum than the cellular and PCS networks, “[T]he transmissions between the aircraft and the ground will not cause any harmful interference to those terrestrial networks.”⁵ Additionally, we agree with Boeing’s assessment that, “the use of this [CMRS] spectrum for off-board links would complicate the interference environment and substantially increase the potential for interference from airborne wireless operations into the terrestrial network.”⁶

We disagree with certain commenters that the potential for interference to terrestrial networks is substantial even when a pico cell is being used. The potential for a pico cell to interfere with a terrestrial network is overstated. Our recent tests indicate that under reasonable restrictions, our pico cell system can operate down to a preset altitude set by the RIAS (Radio Interference Avoidance System) with the threshold of causing no more than a 1 dB increase in the noise floor of thermal noise-limited terrestrial networks.⁷

⁵ Comments of SITA, WT Docket No. 04-435, filed May 26, 2005 (“SITA”) at 19.

⁶ Comments of Boeing, WT Docket No. 04-435, filed May 26, 2005 (“Boeing”) at iii.

⁷ The AeroMobile RIAS is a patent-pending application that manages operation of the on-board aircraft pico cell system to ensure that the system does not cause interference to terrestrial networks. The RIAS application (on the AeroMobile server) utilizes a 3D GIS (Geographical Information System) database in conjunction with longitude/latitude and mean sea level received from the aircraft radio navigation systems. The RIAS can then determine the aircraft altitude above the ground networks and its position, for instance, to country borders. The RIAS manages both the RF from the on-board pico cell and the service offered to the customer on-board the aircraft. If the aircraft descends to below a pre-determined altitude above the terrestrial network, the mobile phone service to the customer is terminated and calls are disconnected (e.g. no service offered). The pico cell

A maximum 1 dB limit, compared to the thermal noise floor, is perfectly reasonable and would not cause harmful interference to terrestrial CMRS networks.⁸ In our own testing, which has focused on GSM networks, Telenor and ARINC have assumed that any resulting interference from pico cell operations to any channel of a system should cause less than 1 dB of increase to that system's noise floor as compared to a thermal noise limited system.

It is important to note here that as one of the largest GSM operators worldwide, Telenor will not support any pico cell solution that has the potential to introduce harmful interference into our own terrestrial wireless systems. ARINC, as a world leader in the provision of aviation communications systems, has as its primary concern that any pico cell system will not create harmful interference and cause a risk to airline safety or communication/ navigation systems. We would expect that pico cell systems that are developed will contain mechanisms to control the operation of onboard mobile phones operating at appropriate altitudes.

The only case that could encounter some minor disturbance is a connection from a distant or deep in-building mobile to a base station where no other interference (e.g. from frequency re-use) is present. Even in this case the additional interference from airborne systems will only result in a temporary increase of the noise of approximately 1 dB and

system continues to operate until the second threshold altitude is met where the on-board pico cell is shut down to stop ground network interference.

⁸ See also *id.* at 14-15 and accompanying notes.

¹⁰ See generally Verizon Appendix – V-COMM Airplane Cabin Leakage Study.

only if a number of aircraft are passing the main lobe of the base station antenna at a low elevation angle.

A crucial parameter for measuring interference to terrestrial systems from an on-board pico cell system is the aircraft attenuation of the on-board generated signals when observed from the ground. Various companies have been, and are currently, performing testing in order to determine a representative value to be used in the calculations/simulations. Telenor and ARINC have recently completed a test where we measured signals received in an aircraft on ground from surrounding base stations, and compared the levels with the signals measured at the same position when the aircraft was removed. By using this method, we reduced the potential near-field reflection effects, which may corrupt measurements such as the ones referred to in the V-COMM report.¹⁰

The indications from these tests confirm that an attenuation value of approximately 10 dB is likely to be encountered for the signals transmitted from onboard handsets situated, in a worst case scenario, within 15 cm of the window of the aircraft inside the cabin. Signals transmitted from a leaky cable in the aircraft roof are even more attenuated due to the leaky feeder antenna coupling loss (60-70 dB at 2 meters), the higher attenuation from the aircraft fuselage due to the antenna position, and the lack of direct line-of-sight to the victim mobile handsets on the ground.

C. GSM Handsets Do Not Pose a Greater Risk of Interference.

As at least one commenter noted, the minimum output power level of a GSM handset is 0 dBm, while the minimum power level of CDMA handsets is -50 dBm.¹¹

¹¹ See Qualcomm at note 1.

This should not lead to the conclusion that GSM handsets pose a greater potential for interference with terrestrial networks. Our testing calculations indicate that limiting GSM handsets to operating at a power of 0 dBm is sufficient to prevent harmful interference to terrestrial CMRS licensees.

D. The Use of Mobile Phones on Airborne Aircraft Should Be Placed Under Reasonable Limitations.

The Commission should adopt rules in this proceeding that are in synthesis with current FAA regulations prohibiting the use of electronic devices below an altitude of 10,000 feet.¹² Accordingly, in order to further reduce the possibility of interference to terrestrial wireless networks, any mobile phone should be turned off below 10,000 feet to comply with the existing FAR 91.21 requirements. In the event that passengers do not comply, the pico cell system on-board will continue to operate, managing the mobile phones until the system is required to shutdown by the on-board RIAS (Radio Interference Avoidance System). As discussed above, the on-board pico cell system can operate at a lower altitude due to the higher isolation offered by both the type of antenna installed on the aircraft (leaky feeder) and also by the additional aircraft fuselage isolation. As far as the traveling public is concerned, the mobile phone service will cease below 10,000 feet.

Offering the service above 10,000 feet is a reasonable limitation because commercial aircraft typically cruise at a substantially higher altitude than 10,000 feet,

¹² See 19 C.F.R. § 91.21 (2005).

generally in the range of 25,000-30,000 feet for short or medium haul flights and 35,000-40,000 feet for long haul flights. Our own testing thus far demonstrates that limiting the operation of a pico cell system to typical cruising altitudes will almost entirely alleviate the potential for harmful interference to terrestrial networks.

E. The Provision of Mobile Phone Service on Aircraft Should Not Be Limited to CMRS Licensees Only.

We agree with Boeing that the provision of mobile phone service aboard aircraft should not be limited exclusively to CMRS licensees. Telenor and ARINC wholeheartedly support Boeing's contention such service should be provided on an unlicensed basis subject to FAA rules and that, "As with all other services provided within an aircraft, selection of the airborne wireless service provider should be left to each airline or aircraft operator."¹³ This approach would foster a climate of competition in airborne services and thus offer the in-flight consumer more choices. In short, it is the only means to allow market forces to work to the benefit of the flying public thereby ensuring the rapid deployment of airborne mobile phone services.

F. We Appreciate the Concerns of Law Enforcement About the Airborne Use of Mobile Phones.

Telenor and ARINC agree that the airborne use of mobile phones raises important public safety and national security issues. These issues can be best addressed through industry/government cooperation. Telenor and ARINC will work closely with Law

¹³ Boeing at ii.

Enforcement Authorities (“LEAs”) in this regard and we feel it would be appropriate for the Commission to require other carriers to do likewise. We do not believe it is necessary for the Commission to modify current CALEA requirements or adopt specific non-CALEA technical capabilities in the instant proceeding as was requested in the Department of Justice/ Federal Bureau of Investigation/ Department of Homeland Security comments.¹⁴

The requirement requested by the DOJ/FBI/DHS that ground stations within the United States’ borders be utilized if telecommunications capability to an aircraft relies upon a satellite band downlink is utilized is particularly unnecessary.¹⁵ The Commission has tentatively concluded that continued use of system-by-system arrangements is the appropriate method for CALEA compliance in the context of satellite systems and will aid in meeting the goals of CALEA.¹⁶ Specifically, the Commission noted in the *CALEA NPRM* that,

“satellite carriers have used an approach based on negotiation, resulting in private agreements to provide information to LEAs. Satellite networks differ in fundamental ways not only from terrestrial networks but also from each other. These differences arise from unique aspects of the type of satellite used in the network (*e.g.*, non-geostationary vs. geostationary satellites) and the gateway

¹⁴ See Comments of Department of Justice/ Federal Bureau of Investigation/ Department of Homeland Security at 7-14 (“DOJ/FBI/DHS”).

¹⁵ *Id.* at note 16.

¹⁶ See *In the Matter of Communications Assistance for Law Enforcement Act and Broadband Access and Services*, ET Docket No. 04-295, RM-1086, FCC 04-187, *Notice of Proposed Rulemaking and Declaratory Ruling* (rel. Aug. 9, 2004) at ¶ 86 (“*CALEA NPRM*”).

earth stations that may be located both within and outside the United States.

System-by-system agreements between LEAs and satellite carriers account for the unique aspects of each system.”¹⁷

The agreement currently in place with Telenor as well as other satellite carriers allows utilization of ground stations not located within United States’ borders as long as the communications are routed through a point of presence located in the U.S.¹⁸ There is no reason to deviate from this well-established practice.

G. The Commission Should Not Consider the Social Effects of Airborne Mobile Phone Use in This Proceeding.

With regard to the concerns about potential negative aspects of allowing wireless devices to be used on aircraft, we are confident that the FAA and aircraft operators will establish practices that will strike a careful balance between the benefits and potential detriments of allowing fellow passengers to use mobile phones in flight.

III. Conclusion

Telenor and ARINC urge the Commission to both lift the ban on the use of Part 22 devices aboard in-flight aircraft and to include other mobile phone interfaces in this proceeding .

¹⁷ *Id.*

¹⁸ *Id.*

In addition, we ask the Commission to recognize the promise that pico cell technology provides to mitigate interference to terrestrial networks and adopt rules that allow pico cell systems to operate under reasonable restrictions.

Finally, we respectfully request that the Commission consider the important ongoing testing of airborne systems as it seeks to promulgate rules that encourage technological innovation and provision of new services.

Respectfully submitted,

On Behalf of:

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and

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